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# **USSR Report**

**NATIONAL ECONOMY**



**FOREIGN BROADCAST INFORMATION SERVICE**

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25 NOVEMBER 1986

# USSR REPORT

## NATIONAL ECONOMY

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## AGRO-ECONOMICS, POLICY, ORGANIZATION

### 'KUBAN' COMBINE EXPERIMENT PROGRESS ASSESSED

Moscow SELSKAYA ZHIZN in Russian 23 Sep 86 p 2

[Article by Yu. Semenenko, SELSKAYA ZHIZN correspondent: "The Strides of the 'Kuban' Combine"]

[Text] (Krasnoyarsk Kray)--A day or two ago, General Secretary of the CPSU Central Committee M. S. Gorbachev paid a visit to the "Kuban" Experimental Agro-Industrial Combine in the Timashevskiy Rayon of the Krasnoyarsk Kray.

This APK [Agro-Industrial Complex], which has already been in existence for two years, has achieved remarkable successes in strengthening the economy, in increasing production and in sales of output. This correspondence discusses the "Kuban" Combine's current affairs and plans.

It will be recalled that two years ago the "Kuban" Combine was made up of 56 kolkhozes, sovkhoses and mezhkhoses, and enterprises and organizations of 13 ministries and departments with an annual volume of output sales and services of R369 million. The combine included cereal products, a motor transport association which has absorbed large-scale and small-scale freight and passenger enterprises, a trust site with its cost accounting brigades (there are no intermediate administrative links--SMU [possibly Special Installation Administration] here), stores, bakeries, restaurants, cafes, procurement offices.... In brief, almost everything in the rayon is to be found under a single roof.

The production, procurement, processing and sale of output is now concentrated in the hands of a few. The "Kuban" Combine's primary goal is to produce more high-quality output with lower expenditures, and to operate on the principles of paying for and financing itself.

The production base lagged for many years, and so, consequently, did the technical level of the processing enterprises. Let us go, together with Valeriy Alekseyevich Masalygin, the director of the Timashevskiy Slaughterhouse and Refrigerating Plant, which is the largest section of the meat-packing plant, around the enterprise's territory. My travelling companion is talking enthusiastically about the present and near future of the subdivision of which he is in charge:



"Gratifying changes have occurred in the course of this experiment. A practically inoperative sanitary slaughterhouse was re-equipped into a smoked meat products shop. The construction trust-site completed its operations after a total of four months. The shop's output per shift comes to two tons of 14 different kinds of products which hadn't previously been produced in the rayon as a rule. They include ham, brisket, bacon etc.

Storage and auxiliary buildings have been constructed as part of the slaughterhouse and refrigerating plant, the refrigeration unit has been rebuilt and a number of new production lines have been installed. Here, they already make use of everything they get from the processing of animals.

A number of similar examples can be presented. Last year, R3.7 million were allotted for the rebuilding of those enterprises and shops involved in the processing of raw agricultural materials. Not a kopeck was taken from the state for these purposes. Agrosnab and POMTOR [Production Association for Material and Technical Provision and Repair] have responded efficiently to all production demands.

Such measures as the setting up of a workshop for renovating disk harrows, and the organizing of sections for manufacturing non-standard equipment, as well as for the repair and technical maintenance of irrigating machines, were dictated exclusively by the interests of this economy.

The mechanization service is oriented toward the final result. For the first time in many years, this service has been praised for the fact that the repair workers fulfilled their assignments by only 78 percent and at the same time saved some R400,000. The machines have only rarely been inoperative, since the quality of technical maintenance and repair has improved.

One of our most important tasks is that of uniting the economic interests of all agro-industrial partners in increasing output production and improving its quality. This year, the combine's goods turnover will amount to no less than R40 million, or almost twice as much as when the experiment started.

The "Kuban" Agro-Industrial Combine avails itself of three channels for selling its output. In accordance with fixed plans, part of it goes into the republican fund, a small portion (mostly fur and tea) is exported and the remainder must be sold through the in-house network of retail trade enterprises and public catering facilities.

"We don't have a thousand customers here, and they dictate the product assortment and determine the quality of the output," says M. M. Lomach, the combine's general director.

Thus this side of the Agro-Industrial Combine's operation has been evaluated for its worth by thousands of Kuban-ites and their visitors. We stop by one of the stores in the center of Sochi. There are more than 30 different kinds of products at the customers' disposal. There are five kinds of half-smoked sausages, ham, brisket, beef, pork, by-products, goose, chicken and rabbit. There is a wide selection of fruit and vegetables.

Customers in the Timashevskiy Rayon have a unified opinion of the combine's output. They feel that its products are superior as to taste and type. True, their prices range from 20 to 29 percent higher than state prices, but they are still considerably lower than cooperative prices. The combine has marked its prices up so as to, and this was foreseen, avoid state subsidies, to ensure that the industry pays for itself, and to have some accumulation. Last year's additional payments for these purposes amounted to R3 million.

Let no one be of the opinion that self-payment has been achieved by the Timashevskiy workers solely as a result of raising their retail prices. Aleksey Petrovich Larin, acting chief of the combine management's planning and economic department has the following to say on this account:

"Our basic orientation points, those by which we maintain our alignment, are reductions in our prime cost and improvements in the quality of our output. The efforts of all this agro-industrial combine's workers are directed to these ends. We utilize such means as intensification of production, improvement of our economic work and the implementation of progressive forms of labor organization and wages. We're putting our planning operation in order. The assignments given to all our subdivisions have far fewer indicators than they used to. The most important indicators are profit, profitability, the quantity of output and services sold, the capital-output ratio and the wage ceiling. A statistical column has been brought in for the kolkhozes, sovkhoses and the inter-farm enterprises. It is based on the production output per 100 hectares of agricultural area. This has effected a marked reduction in the labor intensiveness needed to work up plans and the accountability for their fulfillment. But the main thing is that we have given full scope to agro-industrially-related initiatives and thus allowing us to maneuver our human and material-technical resources more successfully.

"We are meeting with success in our effort to eliminate the lack of correspondence in the forms used to plan out the accounting and the accountability among the agricultural and industrial enterprises. We are standardizing the forms used by the accountants and the planning departments, as up to now the forms have had contradictions."

The combine has its own financial and accounting center. It acts as a singular intra-combine bank while at the same time carrying out the functions of a controlling and administrative organ.

As Vladimir Petrovich Chernyayev, chief of the FRTs [not further identified] says, "All accounting carried out by the enterprises and organizations with Gosbank [USSR State Bank], within the agro-industrial combine itself and with its foreign clients is done through us. Using computers, we draw up a daily balance of the way all the finances move around the 'Kuban' Combine and individually for each of the combine's sections. Having a clear picture of the economic condition allows more efficient administrative decisions to be made. Last year's results show that the total of Gosbank credits were reduced from 51,684 r to 17,850 r, and the present demand for loans is undergoing manifold reductions. The indebtedness to the state has been sharply reduced.

The center, working with the other services, is forming funds unified for the combine to be used for developing and expanding production, material incentives, social and cultural measures, and for reserve. Strict supervision of the financial state has made possible reductions in unjustified expenditures and losses of various kinds, and improvements in the manner in which fixed and circulating assets are utilized. It has also made it possible to effect a more rapid leveling out of the economic system used by the combine's enterprises and organizations. Considerable resources have been allotted to solve those major problems with which individual combine economies and enterprises have found it difficult to cope.

Analysis has shown that the agro-industrial combine is making effective use of such an important source of production of output as the citizens' private subsidiary sector. According to the combine's orders, which have been reflected in bilateral agreements and which are based on mutually beneficial principles, potatoes, vegetables, fruits, poultry and livestock are being cultivated and raised.

Serious efforts are being made to bring inter-farm accounting into every area of activity of the agro-industrial combine. The collective contract is being brought in on a steady basis. It works splendidly in harness with cost accounting. And this is understandable, since its central principle is that of wages for output. Incidentally, this year this system has been extended to the farms' managers and specialists.

The agro-industrial combine's economic service also places a great deal of emphasis on the family contract.

At the present time, there is not a single unprofitable enterprise in the "Kuban" APK. However they are not contented here with what they have already achieved. They are improving their cost accounting and collective contract forms, and are extending the power of these forms to the transport and industrial enterprises and to the construction organizations. A procedure for deducting profits into a variety of funds has been defined. And even that had been established in a totally arbitrary fashion prior to the setting up of the combine, and independent of the efficiency of the combine's work. Nowadays the motivation of the labor collectives has been markedly improved with regard to improving the economic indicators. This was also helped along by the establishment of the differentiated share of profit deductions into the state budget--from 0.7 percent to 63 percent. Formerly, some enterprises gave up as much as 95 percent of their profits. At the combine, they have generally gained an understanding of the various payments into the budget, and have set up a stable procedure which stimulates the creative efforts of the workers. This work has produced quite substantial results. Production outlays for the first half of this year shrank by more than R2 million compared to the same period for last year. All the enterprises have successfully managed to meet their plan targets. Labor productivity increased by 6.9 percent, and the balance of the monies in the current accounts increased from R31 million to R36.1 million.

The farms have provided record high yields of milk and weight increases for their cattle and hogs. Dressed weight meat production increased by 13 percent



compared to six months of last year. Plan targets were overfulfilled for the majority of types of output.

The Timashevskiy Rayon farms have been bringing in record harvests of bread grains these days. Over an area of 52,000 hectares the output of wheat exceeded 52 centners, with a barley yield of some 60 centners. All 125,000 t were graded, just as last year's crop was, with high quality requirements. The "Kuban" will receive an additional sum of about R3 million for quality.

As M. M. Lomach noted: "This year the workers at the grain cereals enterprise have been receiving grain, one could say, directly from the combines. Prior to this the procurements and purchases officers avoided additional work, but now they are concerned about the drying and cleaning of the grain. They have been selling some very hardy grades."

This successfully launched five-year plan period attests to the serious intentions of the more than 30,000 collectives.

However, the "Kuban" has some serious problems. There have been interruptions in the plans for constructing and renovating a number of facilities. This is explained as much by the sluggishness of the APK [Agro-Industrial Complex] workers themselves as by the fact that the Minpromstroy [Ministry of Industrial Construction] directors and the directors of the former Minselstroy [Ministry of Rural Construction] of this republic have delayed the construction of a number of projects.

Sometimes, even Gosbank is limited by this independence. The combine needs processing enterprises immediately. The documentation for a confectionary, for example, already exists. The work could already have begun, but the Gosbank representatives are basing their arguments on the section which states that without fully completed plans, no financing shall be forthcoming. In fact, one can build by "sight-reading", and prevent the loss of an entire year to no purpose.

Production of feed concentrates is in a fever. The trouble is that the RSFSR Ministry of Cereal Products has been careless in allocating certain additives. Another ministry--motor transport--has contrived to let the "Kuban" Combine be treated like "someone else's" problem, without funds for fuels and lubricants and spare parts.

The work on standardizing the output, which has not been completed and has been prolonged in time, not only hinders affairs, but paralyzes all initiative and enterprise. Too much time is spent with agreements and in coordination just for the purpose of delivering a new product to the store counters.

Or take this problem: the combine's workers undergo herculean labors to obtain railroad cars to deliver the output to the union-republican fund.

How can this be? The combine has remained on this side of the departmental fence. Its refrigerators are filled with first-class products, but they are not being shipped. The regional planning commission has manifested an enviable practicality in leaving the combine to deal with its problems privately.

And there is no justification for the cutbacks on the ceiling for gas and electric power, and on the orders for the concomitant goods earmarked for the trade network and the public catering sector. But the main thing causing difficulties for the "Kuban" Combine workers is associated with deliveries of meat, sausage products and smoked foods to the in-house trade sector and the public catering network. In essence, the kray plan has determinedly upset the routine which was, in turn, determined by the country's government. Judge for yourselves: practically the entire volume of meat products production has to be dispatched into the union republic fund.

Every worker in the combine has been effected by the organizational and economic restructuring. The certification of the managers and specialists, carried out at the beginning of the year, has without a doubt had a beneficial effect. Not only were the business and political acumen of the work-force tested, but their skill at working during the restructuring as well.

During the time which has passed since the experiment began, improvements have been manifested with regard to initiative and organizational capability, and the business ties between all links of the agro-industrial complex, which have begun working for the final result, have been strengthened. Production is developing steadily, and the economy is getting stronger.

But nevertheless, the reserves for increasing output production, and particularly of high-quality food goods are far from being utilized completely. There have been occurrences of delivery stoppages, and even the quality of certain batches of vegetables and fruits is not the best.

The combine's directors and specialists are faced with the task of experimenting more actively, searching more boldly for new ways to improve the economic mechanism and taking the path of self-payment and self-financing. For example, an interdepartmental economic accounting system might serve to unite the interests of all the combine's sectors: production, processing and trade. But the problem is that these trends are moving slowly.

The "Kuban" Combine's workers have set high goals for themselves. They are being looked at as trailblazers, and this is honorable. But this places them under an obligation to work with a high degree of intensity, with initiative, and creatively.

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## YAMAL PENINSULA OIL-GAS FIELDS DEVELOPMENT DISCUSSED

## Strategy of Yamal Field Development

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 pp 2-3

[Text] The natural, climatic and geocryological conditions of the Yamal Peninsula have no analogs in the domestic or world oil and gas practice. Gas and oil deposits are located in regions where there are no populated areas, highways and railroad or other facilities of social and industrial infrastructure. Construction and operation are particularly difficult in the regions of the Bovanenkovskoye, Kharasaveyskoye and Kruzenshternskoye fields in which the main deposits of gas of industrial categories are concentrated. Construction and operation conditions are very complicated in the top section of gas main lines (about 400 km). That section contains buried ice and salt-affected soil with ice content and moisture of up to 40-60%. Large amounts of precipitation and insignificant evaporability create conditions for the accumulation of moisture, particularly in the upper zone of soils.

Concentrated ground brines (cryopegs) which do not freeze at temperatures of  $-5$  —  $-10^{\circ}\text{C}$ , as well as buried ice are most dangerous for surface construction. The entire Yamal area is characterized by continuous permafrost with a temperature of  $-10^{\circ}\text{C}$  at a depth of up to 300 m (in the north) and up to  $-5^{\circ}\text{C}$  at a depth of 50 m (in the south). A considerable area is occupied by swampy tundra slimy soil. The hydrographic network is well developed, and considerable moistening makes drainage difficult; the flat relief with a large number of depressions contributes to the development of numerous lakes and swamps. The regions of main gas deposits are all covered with water during flood time.

The average annual air temperature is  $-9.8^{\circ}\text{C}$ ; minimum --  $-54^{\circ}\text{C}$ , maximum --  $32^{\circ}\text{C}$ . The average length of the frost-free period is 54-57 days; the number of days with a snow cover -- 239-250 days a year, with a strong wind (more than 15 m/s) -- 80-120 days. Every year there are hurricane winds with a velocity of 30-32 m/s. It is light around the clock from May to August, and the polar night continuous from December to January. The above does not fully describe the natural conditions of the Yamal Peninsula. However, it is clear what complicated technical and technological problems arise in scientific studies, engineering research and designs of the facilities for the extraction and transportation of gas from the Yamal Peninsula.

To solve these problems, strategic directions have been worked out for the overall development of oil and gas fields of the Yamal Peninsula. Primary attention is given to the development of technical solutions for the construction of field surface facilities and the construction of pipeline systems on the basis of the latest achievements of science and technology, the use of high-capacity equipment, automation and mechanization of production processes and the introduction of an advanced shift-dispatching method for the execution of jobs and operation of facilities.

The scheme for the development of the oil and gas industry on the Yamal Peninsula provides for the outstripping development of the transportation network, power supply facilities, housing and social and cultural facilities, production bases for drilling and acquisition of materials of the construction industry; equipping of oil and gas fields and main gas pipelines with complete sets of high-quality drilling, field and compressor equipment domestically produced and intended for operation in the conditions of the extreme north; maximum transfer of the volume of construction and installation work to machine-building and assembling enterprises; development and wide use of fully automated equipment in the form of complete blocks and superblocks weighing 1000 tons and more; delivery of complete sets of facilities by machine-building enterprises.

Facilities for gas extraction and multiple main gas pipelines laid in one technological corridor will be designed as single system, which will make it possible to combine technological equipment and to reduce the number of stationwide structures to a minimum.

It was found expedient to create first of all an experimental section for testing various systems of laying and methods of reinforcing disturbed permafrost soils in various geographical and geocryological conditions and to organize permanent long-term scientific permafrost stations.

Complications occur with the gathering, treatment and transfer of gas. The traditional methods can hardly be used to the fullest. The danger of the destruction of permafrost soils requires effective scientific proposals for the dehydration and separation of gas and regeneration of reagents, as well as the development of new types of equipment.

For the development of the Yamal Peninsula fields, it is necessary to investigate new, more advantageous technical solutions for the extraction, gathering, treatment and compressing of gas than those which are presently used in the construction of the Urengoy and Yamburg fields. For example, instead of the traditional version in which the number of wells in a cluster does not exceed six, it is possible to consider 20 for the Bovanenkovskoye field and 10 for the Kharasaveyskoye field.

At the Urengoy and Yamburg fields, booster compressor and refrigeration stations are located at UKPG [complex gas treatment plants], while at the Yamal fields, it is proposed that UKPG should only dehydrate gas. The absorbent and methanol regeneration plants, the central warehouse for condensate and booster compressor station should be transferred to the central gas and absorbent gathering station.



The use of highly efficient cassette-type absorbers operating in a wide range of pressures will make it possible to treat gas in the conditions of dropping pressure.

All technological facilities will be arranged on floating block-pontoons, which will make it possible to execute the bulk of construction and installation jobs on the erection of technological housing at plants. Only the installation of block-pontoons in buildings and structures will be done at the construction site.

It is planned to lay pipelines from wells to UKPG on low pile supports because the use of heat insulation in permafrost conditions does not give any positive results, delaying the beginning of soil thawing.

All technical solutions on the construction of surface facilities of the Yamal Peninsula fields must ensure:

smaller areas of construction sites;

gas processing for transfer for the entire period of operation without reconstruction for periods of dropping wellhead gas pressure;

minimizing the number of maintenance personnel through the centralization of processes and changeover to automated maintenance of facilities;

reduction of the volume of construction and installation jobs at construction sites by using unified technical solutions with the use of block-pontoons.

The existing methods of pipe laying used at the Urengoy and Yamburg fields cannot always ensure reliable operation. Evidently, it will be necessary to lay flow lines, collectors and some individual sections of main gas lines on imported coarse-skeleton soil, on pile supports, and perhaps on special trestles, in addition to subsurface laying. This problem has to be solved jointly by specialists of Mingazprom [Ministry of the Gas Industry], Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises], Minkhimash [Ministry of Chemical and Petroleum Machine Building], Minchermet [Ministry of Ferrous Metallurgy] of the USSR, and Minkhimprom [Ministry of the Chemical Industry] of the USSR.

In connection with the decision to build the top section of main gas pipelines for an operating pressure of 9.8 MPa, it will be necessary to have solid and multilayer pipes, special gating equipment, and basic and auxiliary equipment for compressors and refrigeration stations. Moreover, in addition to the above-mentioned ministries, active participation of the Minenergomash [Ministry of Power Machine Building], Minaviaprom [Ministry of the Aviation Industry], Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems] and the Ukrainian SSR Academy of Sciences will be required.

In order to ensure integrated and coordinated work of the ministries, departments and organizations participating in the development of the Yamal Peninsula, it is necessary to develop and approve an All-Union Scientific and Technical Program for 1986-1990 for integrated development of the oil and gas fields of the

Yamal Peninsula which would include the development of special types of equipment, technology and materials, methods for the execution of the jobs on the basis of wide introduction of automation and mechanization of production processes, for ensuring high-quality treatment of gas and condensate at the points of extraction for their further transfer, as well as implementation of measures on environmental protection.

Thus, the strategy for the development of Yamal requires thorough and comprehensive preparation, including solutions of problems of transportation and power facilities, as well as the development of new more effective technical solutions determined by the necessity of overcoming severe climatic and complex geocryological conditions.

#### Ways of Solving Priority Problems

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 p 4

[Article by V. P. Melnikov, Institute of Problems of the Exploration of the North, Siberian Branch of the USSR Academy of Sciences]

[Text] Solution of Yamal problems needs an effective scientific support and transition from an a priori statement of goals and problems to their scientifically substantiated formation.

In connection with the forthcoming development of Yamal gas fields, the institute was assigned the development of a special-purpose complex scientific research program for its development.

The input of science into the development of the Yamal Peninsula is determined chiefly by what scientists can contribute at this stage. A huge scientific potential has already been created, however, it is not used to the fullest. A considerable part of the studies done have not yet found a large-scale consumer, which is the fault of the developers themselves, sectorial science and industry. The path from an idea to its introduction turns most frequently into a labyrinth with a multitude of dead ends. In the meantime, only close interaction of industry, and sectorial and academic science is the way of achieving the greatest economic effect. Unfortunately, it should be recognized that the principle of complexity in solving problems, a problem-oriented approach in the organization of the process of the development of the North and the principles of agreement and coordination of measures are most frequently of declarative nature. But, indeed, these are the principles on which it is only possible to create and realize special-purpose complex programs.

What measures are necessary to implement for their development in accordance with the requirements of the acceleration of the scientific and technical progress? First of all it is necessary:

to provide industry with the necessary scientific methodological materials on the technique of the statement of problems and goals;

to prepare initial classifiers of problems for specific sectors of the national economy involved in the development of the Yamal Peninsula and to transfer them for the diagnosis and expert opinion to academic organizations;

to conduct initial diagnosis and expert examination of the problems.

### Principles of Transpolar Town Building

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 p 4

[Article by V. I. Smirnov and V. A. Klyushin, Leningrad Scientific Research Institute of Urban Development Planning]

[Text] When planning construction under the condition of transpolar regions, it is necessary to be guided by the advanced form of construction system: urban-development type or compact housing complexes, which ensures a reliable social effect.

The basic principles of town-building on the Yamal Peninsula are to create conditions with minimal effects of nature on man.

The requirements for residential buildings of permanent and shift-dispatching settlements are as follows: industrial nature of production; conformity of planning and protective structures with climatic conditions; easiness and low labor intensity of installation, etc.

Cultural and personal services in the base town -- shift team system are provided and realized in the base town. The latter has the bulk of facilities of selective demands, medical services, instruction and relaxation. It is envisaged to have wider network of facilities for cultural activities and sports prophylactic and sanitation facilities than required by SNiP [Construction Norms and Regulations] to compensate for the unfavorable effects of northern nature on the human organism.

In order to ensure high reliability of life-support systems, it is necessary to use electric power widely. It will be expedient to use wind power units in those regions as possible reserve sources.

It should be noted that the development of a social infrastructure in transpolar regions prior to industrial construction is possible only if there is a specialized construction base. By using specialized large prefabricated structures corresponding to the climatic conditions, it will be possible to reduce the cost of 1 m<sup>2</sup> of the total area by 10-15%.

### Scientific Development Methods

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 P 5

[Article by A. A. Gritsenko, All-Union Scientific Research Institute of Natural Gas]

[Text] The geological structure of the Yamal Peninsula is characterized by the presence of several gas-bearing layers consisting of sheet and sheet-massive types of deposits with various thermobaric characteristics and occurrence depths.

On the basis of the analysis of the geological structure of Yamal fields in section, it is possible to isolate three gas-bearing levels: Senoman-stage deposits with a low reservoir pressure at a depth of about 700 m, Aptian-Albian-stage gas deposits with a reservoir pressure of 15-16 MPa at a depth of 1500 m, and gas-condensate deposits below this mark with a condensate content of up to 65 g/m<sup>3</sup>.

The use of traditional methods of development with independent well screens and simultaneous placing of reservoirs on production in this region would require very significant expenses. In order to reduce them, the VNIIGaz [All-Union Scientific Research Institute of Natural Gas] used a systemic approach the main initial premise of which is that a planned constant level of gas extraction from the entire multilayer field should be maintained at a maximum length of the period of constant withdrawal and minimal expenditures on the development and extraction.

Based on this, the entire planned gas extraction should be done from the basic Aptian-Albian-stage complex, into which all of the wells should be drilled. The development of the Senoman-stage deposits will be delayed until the wellhead pressure is leveled with the lower productive formation. From the beginning of the development of the Senoman-stage deposits, part of the operating well stock, including water-encroached wells in the lower formation, are switched to the upper formation, the Senoman-stage deposits.

Increasing concentration in the clusters of operating wells drilled by the slant-directional method will make it possible to reduce considerably the cost of construction.

#### Technical Solutions of Field Construction

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 p 5

[Article by A. V. Buyerakov, A. I. Gorbachev and Ye. Ya. Kats, All-Union Scientific Research and Design Institute of Gas Recovery, All-Union Scientific Research Institute of Natural Gas]

[Text] High economic indexes of field construction can be ensured in the complex geological and climatic conditions of Yamal Peninsula only by fundamentally new engineering solutions based on modern achievements of science and technology.

For developing basic technical solutions on the construction of the Bovanenkovskoye gas field, it is proposed to use a new system of gathering and treatment of gas, when only the dehydration of gas is done at UKPG. Absorbent regeneration and all other auxiliary processes are moved to a single centralized area: the central station of gas and absorbent gathering. It is proposed to place the main equipment of UKPG in open air, sheltering the equipment which requires positive temperatures.

For the first time in the gas industry, it is planned to realize the technology of gas treatment at UKPG without operating personnel.



A digital system of industrial television will be used for controlling and monitoring the operation of UKPG.

The basic needs in heating technological buildings and structures will be satisfied by air heated in gas surface air heaters (GPV) which will be automated and can be operated with their periodic control by the maintenance personnel.

For controlling individual units and the complex for the extraction, treatment and transportation of gas, it is planned to equip the fields with computers and realize a unified integrated automated production control system.

#### Designs of Mobile Buildings and Structures

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 p 6

[Article by N. S. Morozov, A. B. Rubinshteyn, M. G. Taygunov and V. A. Zrelyakov, Experimental Design Office for Reinforced Concrete, Ministry of Construction of Petroleum and Gas Industry Enterprises]

[Text] In the conditions of the Yamal Peninsula, it is necessary, first of all, to develop infrastructure in all its sections on the basis of the complete-unit method of construction. Mobile buildings of industrial infrastructure must ensure the possibility of normal operation for construction organizations even in the initial period of the development of construction sites.

It will be expedient to have the following sequence of creating mobile and production infrastructures when developing construction sites at the Yamal Peninsula:

Pioneer teams of builders must be provided with sets of moveable blocks of the TSUB [All-metal standardized (prefab) unit] type and superblocks with two or three-story apartment-type residential buildings, as well as with superblock shops for routine repairs and maintenance of motor vehicles and construction equipment with rooms for storing tools and the necessary minimum of spare parts.

The greatest effect from residential superblocks for pioneer teams can be obtained if they will have independent built-in sources of heat and power supply.

For mobile social infrastructure, it is advisable to use settlements delivered in sets which would include mobile buildings assembled from block containers and sectional members, as well as inventory items, including engineering networks, foundations, underfloor technical boxes, members of fire walls, small architectural forms and means for transporting the blocks.

For the mobile production infrastructure, it is necessary to organize the production of buildings and the delivery of their complete sets with the use of new promising designs.

In constructing buildings, it is necessary to use the so-called "cross-bar" variant of pile support and to have a ventilated underfloor area.

All of the above solutions can be used also for the main facilities of the oil and gas industry.

#### Plant-Ready Module Blocks

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 p 6

[Article by Yu. N. Permikin, Ministry of Construction of Petroleum and Gas Industry Enterprises]

[Text] For the development of Yamal Peninsula fields with minimal input of human labor, it is necessary to have technologies making it possible to create production capacities and infrastructure facilities from large module-type blocks (superblocks) fully completed at the plant.

For this purpose, it is necessary to conduct a complex of research and design jobs.

Surface Construction. It is necessary to develop competitive preliminary designs for the construction of field surface facilities from block modules fully completed at a plant for facilities of production and nonproduction purposes, to develop designs of supports under block modules without a foundation with heat insulation and minimal layout fill over the entire area of construction sites; to take measures against floods and snowdrifts at the facilities by placing all structures and communications on trestles; to provide for the use of "dry" methods of waste canalization and sewage treatment.

Transportation Facilities. It is most rational to transport floating block modules by towing on water, and then pulling them on shore and delivering to the site by dragging or on an "air cushion"; transporting on the peninsula on caterpillar carriers.

It will be expedient to consider the use of unconventional flying vehicles for transportation.

Pipeline Construction. Pipeline, technological and engineering lines, main oil and condensate lines should be laid on the surface on anchoring ("dead") cryogenic supports with heat-insulated supporting surface; it is necessary to develop compensators (for a pressure of up to 10 MPa) of linear shifting of pipelines with the use of new composition materials.

#### Organization of Construction

Moscow GAZOVAYA PROMYSHLENNOST in Russian No 5, May 86 p 7

[Article by M. S. Royter, Siberian Scientific-Research and Design Institute for Construction of Gas Industry Enterprises]

[Text] In order to carry out the planned construction program on the Yamal Peninsula, it will be necessary in the current five-year plan to build a mobile housing complex for the builders from block modules, enterprises of the construction industry in the block-module version, and to construct and put into operation superblock bases in the region.

The basic technical solutions on the construction of industrial structures call for the method of construction with complete prefabricated blocks. When an enterprise for the assembly of superblocks is created, they can be delivered to the field by the Northern Sea Route on specially equipped barges and by winter motor roads.

For the construction of settlements for shift teams of gas industry workers, it is recommended to use products of the Vinzilinskiy DSK [House-Building Combine]. In this case, there will be only one housing contractor and it will not be necessary to create new subdivisions for assembling housing facilities within the Glavyamburgneftegazstroy [Main Yamburg Administration for the Construction of Oil and Gas Enterprises].

It is preferable to build temporary settlements for the builders at UKPG from complexes of the Oktyabrskiy and Bugulminskiy plants of the Minneftegazstroy which must be reconstructed in the current five-year plan. At the same time, it is necessary to introduce a mobile complex with complete life-support facilities for 400-500 people built from block modules weighing 150-200 tons.

For social, cultural and domestic services facilities, it is recommended to use products of the Bugulminskiy and Surgutskiy plants, and for the construction of KS [cable networks] along the routes -- products of the Ukhtinskiy BKU Plant, which should be specialized in the production of this type of products.

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## FUELS

### COMPREHENSIVE EXPLOITATION OF OIL FIELDS

Moscow PARTIYNAYA ZHIZN in Russian No 11, Jun 86 pp 34-37

[Article by Surgutneftegaz [Surgut Oil and Gas] Production Association Party Committee Secretary E. Stryuk: "The Comprehensive Assimilation of Oil Fields"]

[Text] Surgut, Tyumen Oblast-Statistical summaries of the work of the associations and enterprises of the West Siberian Oil and Gas Complex testify to the fact that, as before, many collectives are not fulfilling the oil production plans. Changes for the better have nonetheless been noted in their activity. The discussion concerns the more skillful organization of affairs and the growth of fuel production. The shortcomings in work indicated at a conference of the party and economic aktiv in the city of Tyumen held last year are being eliminated everywhere, and measures are being implemented for intensifying production and broadly utilizing the achievements of scientific and technical progress that were envisaged by the decree of the party and the government on the comprehensive development of the oil and gas industry of the region.

Practice shows that the return on oil strata can be increased considerably through the incorporation of leading experience into production which, as is well known, does not require large capital investments. This is confirmed by the example of the Surgutneftegaz Production Association.

Our enterprise has not avoided the bitter taste of defeat. There was a time when there was a slump in work, when the association did not handle its plans and socialist obligations. This was a period of difficult testing and alarm for the party organization and a time for seeking bold and well-considered solutions and the development of ways and means of ensuring the regular operation of the fields.

In the early periods of field development, notwithstanding the harsh climatic conditions, the production of oil was quite easy, and large expenditures for its extraction were recouped quickly. This was the time of gushers, the time of easy oil. Current among the petroleum workers then was the expression "The oil is found in sharp drill bits." It means the more wells drilled, the more oil obtained.

Many professional petroleum workers thought it would stay that way indefinitely. Many communists, unfortunately, were also held captive by such ideas. This pertains to our party committee as well. It concentrated its



activity in the drilling teams. The best personnel were sent there and they received universal attention. They received better moral and material incentives than the employees of other professions.

When the wells began to come out of service in the fields, when there were no more gushers from them, while oil production declined, the managers and specialists understood that serious miscalculations had been tolerated in economic activity, that they had been working without a glance toward the future. It is a thing of the past, and much blame falls both to the share of the party committee and to me personally, its secretary--a petroleum engineer having, it would seem, much experience in practical labor in the fields and not a novice in party work either. Nonetheless, not only was a frank acknowledgment of errors required, but also the development of specific measures to get out of a difficult situation.

Naturally, the question of what to do, how to get out of the breakdown, arose before the party organization and the labor collective. Worthwhile problems were brought forward for discussion at party and workers' meetings, at which a search for ways of surmounting the difficulties took place. In its practical work, the party committee counted on a creative approach to the solution of the problems before us, on a business-like manner, on collective reason and the experience of the masses.

A detailed analysis done by the party committee and the reports of managers, as well as the conclusions of commissions monitoring the activity of the administration in the operations of the oil- and gas-producing sectors, led to one thing: the shut-down wells had to be converted to a mechanized production method immediately. Moreover, this had to be done systematically, purposefully, the wells must be equipped with pumps, they must be converted to a gas-lift method of field exploitation.

The party committee influenced the resolution of the management tasks with its characteristic methods. First and foremost, it improved the style of its activity, raised the level of organizational and political work with the people, raised the initiative and readiness for action of the shop party organizations and party groups to the utmost, improved the selection, placement and training of personnel and strengthened the monitoring and verification of execution.

Taking into account the large amount of impending work in the oil fields, especially in the renewal of shut-down wells, the party organization formed a standing commission to monitor the activity of the administration in the repair of wells, orienting it toward the search for internal resources, the deep study of the practice of producing sections, the maintenance of strict discipline and order in production and the raising of the responsibility of personnel for the matter entrusted to them. At the recommendation of the commission, practically all of the subdivisions of the association were employed in the repair of the bore-holes--the oil- and gas-producing administration, the administration for drilling operations, the transportation enterprise and the internal repair services. Each of these collectives

received plan targets for well renewal and the rendering of the appropriate services to the basic types of production, over the fulfillment of which monitoring was established both on the part of the commission and on the part of shop party organizations and party groups.

An analysis conducted by the party committee showed that there was a very low party level in the underground well repair teams--four communists for every hundred workers. Moreover, the people had to work in small groups in remote sectors. This means that in the lower collectives the zone of party influence was limited. Past practice had an effect, when the party committee had devoted insufficient to strengthening the auxiliary and maintenance types of production and services. The time had come to put an end to this practice.

The party committee adopted a resolution on the direction of communists and specialists for work in the underground well repair teams. The question of exactly whom to send there arose at once. Invite people from outside? This was unrealistic. Reserves had to be found on the spot, in basic production, through the better placement of personnel. Shop managers and the secretaries of shop party organizations and party groups did much to select candidates to work as repairmen. They studied the people attentively, their business and moral qualities, and held individual discussions with them.

Special attention was devoted to the managers of the most basic link of the administration--the team leaders and foremen both in drilling subdivisions and in well underground and capital repair. One of the principal areas of the activity of the party committee and the shop party organizations was the formation of stable teams and their conversion to collective contract and economic accountability. And equally as important, they conducted much work directed toward the expanded involvement of laborers in production management. At the same time, the party committee raised all-around exactingness toward the managers of subdivisions and economic services for improving planning and the organization of labor within production, and tracked whether the teams and sections received their plan targets in a timely manner and provided for the essential monitoring of their fulfillment so that the wages manifested the ultimate results of labor. The party representation in the well underground and capital repair teams was increased considerably. The work of team councils was made more active.

The party committee paid strict attention to the organization of operations according to the expeditionary-duty shift method. Shop party committees and party groups were formed in the duty-shift collectives. The temporary party groups that combined the party members of the various organizations operating in one place acquitted themselves well. They were headed by the most reputable communists: P. Popov, Ye. Makarov, V. Buchkovskiy and V. Gaydadyan.

All of the structural subdivisions of the various ministries and departments working in the field were considered to be a single collective, the material and moral incentives for which were arranged based on the ultimate result--the production of oil. Of course, every production collective worked according to its own plan and preserved its departmental subordination. At the same time, its work was evaluated according to the contribution to the overall cause.

To be candid, it must be acknowledged that it was difficult to overcome so-called departmentalism. The field operational workers yielded the work front to the repair workers unwillingly or did so without the proper preparation of production. Material sanctions for violating the agreements and schedules did not have the necessary effect.

The party committee obligated the secretaries of the party organizations of the oil-production and repair shops to monitor strictly the obligations adopted mutually by the collectives. The peoples' inspectors were also made more active. The systematic conduct of raids and verifications and a strict demand of managers for the organization of affairs brought a clear and reliable rhythm to the work.

Socialist competition was developed among the drilling teams under the slogan "The Wells--Ready to Go!" They took on not only the obligations to drill and assimilate the wells, but also to participate in the support construction, to set up pumping jacks and to supply the construction and pipeline organizations with materials and work fronts. In short, the drilling workers took a large burden onto themselves and did everything possible so that the operators did not divert their own productive capacity and personnel resources from their basic business.

The joint sessions of the party committees of the drilling and oil-producing administrations and the construction organizations played a large role in this important undertaking. The harmonious work of the party committees had a beneficial effect on the activities of the managers and labor collectives. Every time a difference of opinion arose between the managers of the enterprises of related industries, when they could not find a mutually acceptable solution, the party committees, which did not have narrow departmental interests, were included. They had only one interest--the interests of the state. The party committees of the Surgutneft [Surgut Petroleum] Oil and Gas Production Administration, the Surgutneftstroy [Surgut Petroleum Facilities Construction] Trust, the Fedorovskneft [Fedorskiy Petroleum] Oil and Gas Production Administration and the Surguttruboprovodstroy [Surgut Pipeline Construction] and Surgutneftepromstroy [Surgut Construction of Petroleum Industry Enterprises] trusts operated especially harmoniously together.

The work produced good results. Over the last five-year plan, three new oil fields were placed in operation. Some 80 percent of the wells were converted to the mechanized recovery method of crude petroleum. Thanks to the repair teams, the inventory of idle wells was brought to the standard level. The gas-lift method of oil extraction was widely disseminated.

The party committee constantly strives to see that its field of vision includes not only production issues, but everyday ones as well. After all, highly productive labor depends greatly on the concern manifested for people. I will cite a single example.

It became known to the party committee that the underground and capital well repair teams were poorly supplied with hot food and had to spend from one-and-a-half to two-and-a-half hours on lunch. It turned out that it was unprofitable for the public catering service to deliver food to the fields in small batches.

This provoked a comprehensive study of the domestic services for the petroleum workers in production. Several business managers were called to account at a party committee session for omissions discovered in the course of verification. Many shortcomings have already been eliminated. As regards the feeding of people in the fields and in the duty-shift settlements, thermos containers with hot food are now delivered there according to a strict schedule.

Our collective successfully handled the plan targets and socialist obligations of the 11th Five-Year Plan: 415,000 tons of petroleum beyond the plan were extracted from the underground storerooms. The petroleum workers and working ahead of the schedule this year. About 200,000 tons of crude hydrocarbons were obtained beyond the plan over January--April.

In striving to ensure the regular production of oil, the party organization is trying to bring the human factor into effect, so that each works creatively and with inspiration.

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## ELECTRIC POWER GENERATION

### MOSCOW TV CRITICIZES PREDICTIONS OF WINTER POWER CUTS

LD290033 Moscow Television Service in Russian 1530 GMT 28 Oct 86

[From the "Vremya" newscast; talk by political observer Georgiy Pryakhin]

[Text] Hello, comrades. From the summer, and earlier than in previous years, we have been making joint preparations for the winter. Of course, how well we have prepared for it will be shown best of all by the winter itself. Nevertheless, it is already possible to speak about certain specific results of these preparations.

If one speaks of the power industry, it was necessary to overhaul equipment to an overall capacity of 102 million kw by winter. Equipment of 90 million kw capacity has already been overhauled. The overhauling of the rest will be completed literally in the next few days.

Second, the stocks of fuel at the power stations are considerably higher than last year. For example, 2.7 million tonnes more coal and 350,000 tonnes more fuel oil have been laid in stock than last season. A part has been played here, of course by the stable work of the country's coal-miners and also by the fact that since September oil workers have achieved a stable overfulfillment of their daily tasks for oil extraction, and by the efforts of the transportation workers.

The tasks has been set of significantly improving the utilization of power industry capacities. Thus before the end of the current year about 4 million kw of under-utilized capacities, to use the technical language, is due to be brought into the energy balance. Energetic measures are being taken to speed up the entry into service of power industry installations.

Here is just one of these measures. An additional 8,000 or so qualified specialists from other construction ministries have now been sent to power industry installations due shortly to be commissioned in order to assist construction workers of the Ministry of Power and Electrification.

Why then am I speaking about all this in such detail? First, it is to present a general picture in this matter—and it is a pressing matter that concerns us all. Second, let me cite a report that was broadcast recently by Deutsche Welle. The report has a clear aim. The radio station reported that DIE WELT has been

attempting to analyze the measures to save electricity that are being taken in the USSR. These measures--and I quote--are intended to avert a possible catastrophe in power supplies during the winter months. That is what was said, no more and no less. The newspaper and Duetsche Well go on to engage in open slander by stating that in the districts in our countries that are linked to thermal district heating stations room temperatures are to be lowered to 13 degrees. Can you imagine that--to 13 degrees! On the basis of this they predict possible grave illnesses and mortality amongst the very young and the elderly.

Translated, DIE WELT means "the world"; therefore there must be some kind people and kind uncles in the world!

What then has produced this such moving concern? What has dictated this lament and this clumsy attempt to instill fear in you and me? The answer is altogether simple, even primitive. All this, the same report says, is the result of the Chernobyl accident.

We do not underplay the pain of the Chernobyl trouble nor the economic cost of the accident. Nevertheless, along [with] the hypocrisy of DIE WELT and Duetsche Well there exists another science that is simpler and more reliable--namely, arithmetic. Yes, capacities of 4 million kw were taken out of the country's energy balance through the Chernobyl accident, but in our country we possess not 4 million and not 5 million and not even 100 million kw capacity, but indeed over 300 million kw. Such is the overall energy potential of the USSR.

So, it is justifiable to speak here of a power industry catastrophe on a national scale? No, of course, it is not justifiable. What is more, it is well known that one of the power-units of that same Chernobyl station has already been started up and is in the process of becoming fully operational. A second unit will be put into service in November. In addition three new power sets, each of 1 million kw capacity, will be put into service during November and December at other atomic power stations. Powerful generating sets at a number of thermal stations will also be brought into use ahead of schedule from the 1987 plan. That is the real picture.

Tell me, to whom, to which places and to which world does the symbol belong of homeless and also as a rule unemployed people spending the night over sewer gratings, the only source of heat available to them? Everyone knows that it does not belong to our Soviet realities. But the fact is that Deutsche Welle traditionally bites us, while just as traditionally it only licks other shores, and indeed does so with the tenderness of the southern seas. In this case too its lament is slanderous, false and, what is no less obvious, provocative.

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## PIPELINE CONSTRUCTION, OPERATION

### INDUSTRY GOALS DURING TWELFTH 5-YEAR PLAN

Moscow STROITELSTVO TRUBOPROVODOV in Russian No 4, Apr 86 pp 2-3

[Article from the periodical "Pipeline Construction"]

[Text] The Basic Directions of Economic and Social Development of the USSR for 1986-1990 and for the Period up to the Year 2000 call for the following:

To develop the fuel and energy complex more effectively and to realize the Energy Program of the USSR.

In pipeline transportation, to increase substantially the construction of gas transfer networks and oil-product pipelines, as well as branch lines to consumers. To intensify work on the use of pipeline hydrotransportation of ore concentrates and coal.

Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises], in order to ensure the production of 835-850 billion m<sup>3</sup> of gas and 625-640 million tons of oil and gas condensate in 1990, must build the appropriate transportation facilities. It is planned to lay more than 60,000 km of gas and oil product trunk pipelines, 70,000 km of field pipelines and to build 400 compressor and pumping stations.

It is expected to obtain the main increments in the production of oil and gas from the Tyumen fields. In that region, the volume of oil and gas condensate extraction must be brought to 422-437 million tons.

It is planned to lay six new gas-transfer systems from the Yamburg and Urengoy fields to the regions of the Center, Kazakhstan, as well as an export trunk line to the western boundary of the USSR. The total length of the pipelines in the system will be 28,700 km. Along these trunk lines, 170 compressor stations will be built.

In five years, to increase capital investments into the national economy by 18-22% and the volume of contracted jobs by 16-17%.

Minneftegazstroy will realize the largest construction program in all preceding years. The volume of construction and installation jobs in five years has to be increased by 33%. The volume of contracted construction and installation jobs by the industry must exceed 8.5 billion rubles by 1990. The part of surface construction will amount to more than 65%.

Labor productivity in construction must be increased by 16-17%.

In five years, labor productivity in the industry will increase by 25% in pipeline construction and by 17% in surface construction.

To consistently carry out further industrialization of construction, changing it into a single process of constructing facilities from plant-produced members. To change to the delivery of engineering and technological equipment to construction sites in large assemblies.

In Minneftegazstroy, the complete-unit method will become the main method in the development of fields.

In Western Siberia, it is planned to construct surface facilities at 46 new oil fields. The main gas fields are Yamburg and Yamal. Extensive work has to be done at Karachaganak and Astrakhan fields. By 1990, facilities will be built at the Caspian oil and gas complex for the production of 22 million tons of oil and gas condensate, 26 billion m<sup>3</sup> of gas and for the production of 4.8 million tons of sulfur. The volume of contracted jobs will be 1.8 billion rubles.

In order to accomplish such a strenuous program of jobs, fundamentally new solutions will be used for the equipment, technology and organization of construction.

The large intersectorial program "Block" is intended for the coordination of work of all participants in the development of the complete-block method of construction of the facilities of the oil and gas industry.

The volume of construction and installation jobs performed by this method will increase to 8.6 billion rubles, including 6.4 billion rubles in Western Siberia. At the Yamburg field, superblocs weighing up to 350 tons will be used for constructing the first complex gas treatment plant. The changeover of construction to superblocs weighing 1000-1500 tons will make it possible to deliver complete structures to the construction site. By the end of the Twelfth Five-Year Plan, the association "Sibkomplektomontazh" must produce up to 150 such structures a year.

The creation in the Minneftegazstroy system of a specialized scientific research and design institute for complete-unit construction (NIPIKBS) will make it possible to increase the effectiveness of this industrial method even more.

In field construction, intensive methods of the flow-line organization of construction of complex gas treatment plants will be developed further. Surface laying of technological pipelines and engineering networks will be used widely, including the use of heating cables and effective heat-insulation materials.

Attention will be concentrated primarily on the production of machines, devices, tools and other products making it possible to considerably raise the technical level of construction and to sharply reduce the use of manual labor. Sets of machines, mechanization facilities and tools necessary for overall mechanization of construction processes are to be produced.



The use of resistance welding of pipelines will be substantially expanded in the Twelfth Five-Year Plan. By 1990, this most productive and automated method of welding jobs was used for 40% of pipelines with a diameter of 530 mm and for 20% of pipelines with a diameter of 720 mm and more. More than forty types of new equipment, devices and materials for welding and quality control of this process will be developed and put into production.

It is planned to increase the use of automatic welding of large-diameter pipelines to 70%. This will make it possible to reduce the standard number of welders by 5,000 persons and to handle the increased volumes of the oil and gas construction almost without increasing the number of highly skilled specialists.

In the construction of the Yamburg field, it is necessary to solve the problems of maximal mechanization of welding jobs, to speed up the development of technological solutions for the assembling and welding of pontoons for superblocks, to develop equipment for welding plastic pipelines and to take measures improving the quality and reliability of welded joints.

A machine-building subindustry has been organized in the ministry and is functioning successfully. By 1990, the association "Soyuztransprogress" is planning to increase the output of their products to 180 million rubles. This index will be achieved chiefly through the reconstruction and technical reequipping of the existing enterprises and the construction of a new plant in Neftekamsk for the production of transportation-technological equipment for constructing gas and oil pipelines with a capacity of 80 million rubles of products a year.

It is planned to raise sharply the technical level of production through the introduction of digital program controlled machines, technical robot complexes and automatic control systems. The machine-building plants will increase the output of high-capacity excavation equipment, pipe bending devices, transportation facilities, lifting devices, and components for developing new types of transportation. Much attention will be given to the maintenance of equipment used at the construction sites.

It is planned to improve the structure and quality of structural materials in order to develop new advanced equipment and realize the policy of conservation of resources in the development of the national economy. The development of the production of economical type of metal products, synthetic and other advanced materials will be accelerated; the list of construction materials will be expanded and their technical, economic and strength characteristics will be improved.

The construction industry will increase the output of its products by 34%, which includes a 29% increase in the volume of output by the construction materials industry and a 2.6-fold increase in the output of the chemical industry. The production of container-type rooms for improving living conditions along the routes and construction sites will be increased by more than one third.

The level of the industrialization of construction will be raised by a 50-55% increase in the output of light protective panels with effective heat insulation

and an almost 30% increase in the output of completely prefabricated buildings and compartments. There will be 5.9-fold increase in the output of pipe units and a 24% increase in the output of connecting parts. By the end of the five-year plan, it is planned to switch to the delivery of complete sets of pipe assemblies and light protective panels for compressor and pumping stations.

The production of new advanced structures and materials is being organized: cement-shavings plates which will make it possible to develop a highly mechanized production of residential and container units. It is planned to develop a highly mechanized production technology of polyethylene adhesive tapes plied with butyl rubber for insulating trunk pipelines. Economical technologies will be developed further. There will be an increase in the volume of the processing of reinforced-concrete products in the medium of combustion products of natural gas and the use of plasticizing additives in the production of reinforced concrete.

The use of wastes of wood-working plants will increase in the production of industrial products and consumer goods.

Due to the growth of gas and oil production on the Yamal Peninsula and the movement of the front of construction and installation jobs to the extreme north connected with this, special attention will be given to the strengthening of the production base in the Komi ASSR. It is planned to double the capacities for the production of prefabricated reinforced concrete structures and non-metallic building materials in that region.

The well-being of the Soviet people will be improved further and their growing material and spiritual needs will be better satisfied. The effect of social measures in the development of production and growth of its effectiveness will be intensified.

Priority will be given to the allotment of state capital investments into residential, social, and cultural construction in newly developed regions, particularly in the regions of the North, Siberia and the Far East.

More than five million  $m^2$  of housing will be completed, including 3.3 million  $m^2$  in Western Siberia, which will make it possible to change the structure of the available housing qualitatively. The living conditions of builders in field towns will improve. Sociodemographic characteristics of the workers will be taken into consideration in the structure of the new housing facilities. The construction of houses for small families and of dormitories will be increased. Then it will be possible to provide housing for all who need it with consideration of the increase in the number of workers. Priority will be given to workers in new regions of intensive oil and gas construction, particularly in Yamburg, Kazakhstan and, eventually, at Yamal.

Availability of preschool children institutions for the families of builders will reach 92% by the end of 1990. Average monthly earnings of construction workers will increase to 345 rubles. Increases in the incomes of the workers will be distributed among their various categories with consideration of the complexity, volume and conditions of their jobs, eliminating the unjustifiably big gap between the wages of workers and engineers and technicians. The wide

introduction of collective payment for labor according to team and multiple contracts will ensure appropriate remuneration for each worker, will increase his interest in his work and will improve the relations and discipline in the teams.

It is planned to perform 65-70% of the total volume of construction and installation jobs by the team-contract method by 1990.

The improvement of living standards, particularly in Western Siberia, is directly connected with further development of commodity circulation. It will increase by 30% per worker, and by 43% in Western Siberia. The sales volume of domestically produced commodities will increase by 23.3%, in Western Siberia -- by 19.5%. Special attention will be given to medical services. The network of medical and first-aid stations will be expanded. Mobile forms of medical aid will be developed further.

The introduction of the methods of psychophysiological selection and training of workers will improve the quality of the labor resources and the efficiency of the working teams, which will help keeping the workers in production. Professional training will be given to almost 170,000 workers, in Western Siberia -- 73,000 people.

Within the overall program for socioeconomic development of the industry, territorial subprograms are being developed for the transpolar zone of Tyumen Oblast, Middle Ob region, Western Kazakhstan, and Central Asia with a more thorough study of the problems of the overall socioeconomic improvement and development of these regions of intensive oil and gas construction.

In order to increase food resources, it is planned to give every possible help for the development of subsidiary farms of enterprises and organizations.

By 1990, subsidiary farms of the industry will increase the production and sales of meat to 7,500 tons, and the production and sales of milk to 25,000 tons. There will be a considerable increase in fishing, production of honey, potatoes and vegetables. It is planned to organize 23 new large sovkhoses. In order to strengthen feed resources for the livestock and poultry, 25 river and swamp mobile feed plants will be built. Measures will be taken for the development of a local processing facility, which will make it possible to reduce losses in agricultural and animal-husbandry products and to organize the production of high-quality consumer goods.

By 1990, subsidiary farms of the industry will produce not less than 15 kg of meat and 50 kg of milk per worker.

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## LABOR

### HISTORIANS VIEW WORKERS' ROLE IN ACCELERATION

PM291408 Moscow PRAVDA In Russian 24 Oct 86 First Edition pp 2-3

[Article by Doctor of Historical Sciences Professor E. Klopov and Doctor of Historical Sciences Professor L. Gordon under the rubric "Questions of Theory": "The Main Social Force for Acceleration"]

[Text] The CPSU's strategic course of accelerating the country's socioeconomic development can be implemented only through the radical restructuring of all spheres of society's life. In order to resolve this truly revolutionary task, it is necessary to involve the broad masses of working people in energetic creative activity and to rely on the people's intelligence and talent. Here the party counts first and foremost on the working class, seeking to maximize the utilization of its mighty social potential and its readiness to implement socialist transformations.

"The political experience of the working class, its high level of consciousness, its organization, and its will, unite our society," the CPSU program says. "The improvement in the general educational, cultural, and professional standard and in the labor and sociopolitical activeness of the working class steps up its vanguard role in improving socialism and in communist building."

The norms and principles of collectivism elaborated by the working class now determine the system of social relations and the very tenor of life for the people's masses. On this basis Soviet society's sociopolitical and ideological unity is becoming increasingly strong and the process of rapprochement of the working class, kolkhoz peasantry, and intelligentsia is deepening. As a result the CPSU, while still the party of the working class in terms of its class nature and ideology, has become the party of the entire people. Of course, this considerably increases the role of the working class as the leading social force in improving socialism.

Great significance is also attached to making the working class a significant majority of the Soviet people: Whereas 6 decades ago, when plans were being drawn up for the radical technical modernization of the USSR's national economy on the basis of industrialization, workers' families accounted for less than one-eighth of the country's population, today, now that the course has been set toward a new technical modernization of social production, they make up nearly two-thirds of the population.



The sphere of the working class' production activity has widened substantially: It participates directly in the resolution of the range of tasks outlined in the Basic Guidelines for the Economic and Social Development of the USSR for 1986-1990 and for the period through the year 2000, tasks given concrete form in the 12th 5-Year Plan. The majority of workers (more than 61 percent) are still employed in the industrial sector of the national economy--industry, construction, transportation, and communications. At the same time one in four works in the service sphere; workers make up approximately one-half of the people employed in agriculture; and they account for around one-third of all those employed in science and scientific services.

The cultural and technical level of the working class is constantly rising. The main bulk of the working class is made up of skilled and highly skilled workers. The majority of Soviet workers have now received a complete secondary education (whereas at the end of the fifties fewer than 9 percent of them had that level of education, and at the beginning of the seventies the figure was 20 percent). As was noted at the international conference "The Working Class and the Present Day," the ranks of the USSR's working class are increasingly filled with representatives of highly skilled labor, not only or even chiefly physical labor, but to a significant extent mental labor too.

In contrast to the early stages of socialist transformation, in the labor collectives the majority consists, as a rule, of cadre workers who have profoundly assimilated the basic social and political principles of their class. The level of organization of the working class has reached a high standard. Thus nearly all workers and employees [sluzhashchiye] are now united in trade unions. There are 8.6 million workers in the ranks of the CPSU, that is, approximately one-tenth of the working class. Thus the Soviet working class has reached a high standard of social development and a far greater level of preparedness for socialist creation than ever before. And that is the reliable guarantee of the implementation of the strategy of accelerating the country's socioeconomic development and radically restructuring all spheres of society's life. However, for these processes to develop more successfully it is necessary not only to strengthen the creative potential of the working class, but also--most importantly--to ensure the full realization of that potential. That is why, as is stated in the 27th CPSU Congress Resolution on the Central Committee Political Report, the party regards it as the cornerstone of its policy to "ensure the leading role of the working class and strengthen the alliance of the working class, kolkhoz peasantry, and labor intelligentsia."

What determines the concrete content of a policy which promotes the growth of the role of the working class as the main social force for acceleration? Above all, the fact that an economy with the highest possible level of organization and efficiency (which is what we seek) needs working people who have organized, disciplined, and prepared both professionally and psychologically for changes in the production base. Even now, sophisticated equipment is inefficiently utilized because of the insufficient skills of workers and engineers. Moreover the material and moral damage resulting from incompetence on the part of working people will increase--substantially, at that--as the transition takes place to technologies using the latest achievements of the scientific and technical revolution.

We can therefore say that for all young people today to receive vocational training alongside their complete secondary education is now an essential condition for increasing the working class' role in the acceleration of Soviet society's socioeconomic development, just as the elimination of adult illiteracy, universal primary education for children and adolescents, and the creation of a system of mass training in the professions in the production process were essential in the years of the first 5-year plans. The resolution of this task has already begun: More than half the young people who have received secondary (complete and incomplete) education undergo training at vocational and technical schools. But behind these favorable quantitative indicators are the complex and as yet only poorly resolved tasks of improving the quality of training at vocational and technical schools and carrying out that training in line with the requirements of the modern economy.

At the same time many unskilled or low-skilled workers are still employed in the USSR's national economy. It must also be taken into account that the professional knowledge of many skilled workers has become substantially outdated. In general, as the achievements of the scientific and technical revolution are introduced into production and the processes of renewal of equipment are accelerated, so the time taken for professional knowledge and skills to become outdated will grow shorter and shorter. This means it is necessary to ensure improvements in skills within the framework of those professions which the workers have already mastered, and also to train them in new professions. Otherwise there will inevitably be both economic losses (associated with the inadequate utilization of sophisticated machinery) and social losses (since complications will arise as regards providing jobs for those workers whose professions have become obsolete). Much is already being done to tackle these tasks. Thus in the second half of the seventies and the first half of the eighties 7-7.5 million workers learned new professions or specialities in production every year. The number of workers improving their skills in one form or another is increasing: In 1970 the number was 7.4 million, in 1975 it was 14.7 million, in 1980 21.3 million, and in 1985 28.1 million. However, each enterprise or association is here frequently guided only by its own requirement for worker cadres; and the quality of training not infrequently fails to satisfy modern requirements.

A long-term all-union program is therefore necessary for improving the working people's skills and retraining them, especially workers and specialists. It is also necessary to take care, of course, to ensure that the level of workers' professional skills increases substantially even during the 12th 5-Year Plan, which has a special role to play. During this period it is necessary to halt the unfavorable trends in the economy's development, give it greater dynamism, increase the pace of production, radically restructure the economic machinery, and implement major social programs. The decisive contribution to the fulfillment of these large-scale plans can and must be made by the working class. "A steep increase in labor productivity, output which is up to world standards, the highest possible quality and reliability of output, a fall in the materials-intensiveness and energy-intensiveness of articles, and complete financial autonomy--those are the guidelines for worker collectives today," the CPSU Central Committee Appeal to the Working People of the Soviet Union notes.

an equally important (or even more important) prerequisite for increasing the working class' role in the acceleration of the country's socioeconomic development is the creation of conditions to ensure the full realization of its creative potential, conditions stimulating active participation in the restructuring. Without these conditions the growth of the workers' qualifications cannot in itself produce the necessary economic results. It is well known that in the seventies and early eighties, despite the rapid increase in the general educational and vocational training of workers, the rates of growth of social labor productivity fell markedly, the quality of output deteriorated, and the meaning of competition was weakened.

At the same time, "Stagnation phenomena have begun to appear" in our society's life, as was stated openly and honestly at the 27th CPSU Congress. The active-ness of the labor collectives has begun to fall and there has been a certain evaluation of the working class' important social values and the principles of honest, fully committed labor and collectivism. Stagnation in the forms and methods of management and hopes of being able to "improve things without changing anything" have created a favorable atmosphere for those who would like to give society as little as possible and take as much as possible from it. Such people--and unfortunately they are many--exist even among the workers. Thieves, violators of labor discipline, shoddy workers, drunkards, and embezzlers of socialist property do great economic and moral harm to society.

In the period preceding the 27th CPSU Congress the party Central Committee properly assessed the situation in the country and spearheaded the movement to impose order in all spheres of society's life, and first and foremost in production. As a result the working people's activeness began to increase markedly. It was strengthened still more after the congress. All the same, a sober evaluation of both the achievements and the persisting shortcomings shows that the main reserves for activating the human factor have not yet been brought into play. Today more than ever before it is necessary to open up scope for the masses' initiative and creativity, and this requires constant improvement of the machinery for involving the working class and all working people in the direct, practical solution of urgent tasks at this crucial stage in Soviet society's development.

The most important components in this machinery are the development of the people's socialist self-management, the consistent widening and deepening of democracy, the cultivation in all USSR citizens of a sense of being masters of their country, and the increasingly full implementation of the principles of social justice.

In the conditions of socialism, problems of human dignity, freedom, and social equality hold a special place among the workers' vital interests and ideals. The workers are less and less satisfied with the position of "cogs" in the social machinery and mere executors of instructions "from above," even if those orders are the right ones. The modern Soviet worker, like any other true citizen of the fatherland, seeks to take part in adopting the decisions which determine the significant circumstances of the life of society and the collective and his personal well-being. For a person to work efficiently and care about fulfilling pledges to his comrades at work and to other collectives, it is



important to ensure that he feels that he is the master and acts like the master of his enterprise, and that at the same time he is, as Lenin put it, his country's representative, a representative with a real opportunity to influence the organization of production and the distribution and utilization of the results of labor.

However, as was noted in the CPSU Central Committee political report to the 27th party congress, "it is naive to imagine that the sense of being the master can be cultivated by works along," it "is formed above all by the real conditions in which a person is placed." Over the decades of the functioning and development of the Soviet socialist economy, much has been done to create these conditions. At the same time the successes achieved in this sphere should not be exaggerated. The point is that the methods of management of the national economy which still prevail, whereby many problems which could and should be resolved on the spot are in fact resolved by central organs, substantially restrict the rights of enterprise collectives. As a result in many workers the sense of being the master, of being responsible for the state of affairs at their enterprise and having the power to influence the course of those affairs, is either dulled or is not developed at all.

And conversely, the transition to running enterprises and associations on the basis of the principles of financial autonomy, self-financing, and paying your own way creates favorable prerequisites for increasing the workers' role in management. Moreover participation in the elaboration of management decisions becomes an essential factor in the successful work of labor collectives. In order to develop the self-management activity of worker collectives, it is necessary to develop appropriate methods and forms of involving the collective's members in that activity. Financially autonomous teams or contract teams managed by elected team leaders and councils are an important instrument for developing self-management by worker collectives. Much experience has been accumulated here, but it needs support and broad dissemination.

The new economic management conditions stimulate the further development of socialist competition--a development which, most importantly, accords with the spirit of the times--and step up its role in activating the working class' struggle for the implementation of a radical turn toward the intensification of social production. They ensure the comparability of the activity of all labor collectives and every working person and help to determine more accurately whose contribution to the acceleration of Soviet society's socioeconomic development is greater and whose is smaller, whose labor productivity is growing more rapidly and whose level of actual utilization of equipment, materials, and power is higher. The introduction of full financial autonomy also creates a basis for determining the price paid for success and for defining the damage done to society or to the enterprise as a result of nonfulfillment of the plan, the production of poor quality output, thriftlessness, or extravagance. In other words, in these conditions it will really be easier to see which collectives or groups of workers are in the front ranks of the competition and are promoting the restructuring, and which are hampering it.

The new forms of participation by the working class in production management--forms originating in its own creativity--can also have a considerable and



perhaps decisive influence on the increasingly full establishment of social justice in society's life, especially in the sphere of distribution relations. The vast majority of workers have a vital interest in ensuring the strictest observance of the basic principle of socialism, "From each according to his abilities, to each according to his labor," and in resolutely eradicating both wage leveling and unearned income. Deviations from this principle, as the experience of the recent past has shown, lead to disorganization in production, lessens the enthusiasm of conscientious workers and encourage those who are less zealous, and ultimately reduce the working class' influence on the progress of Soviet society's economic and social development.

Of course, it is by no means easy to find forms and methods of labor remuneration which take precise account of each worker's individual contribution to the production of material assets or services. But the quest for the correct solutions will be more fruitful as the working people, production collectives, and public organizations become involved more actively in this work. The earned labor ruble can and must be an effective incentive to conscientious, honest, efficient labor.

The communist party sees the mobilization of the working class' creative, constructive forces as the most important prerequisite for the implementation of its strategic line aimed at radically renewing Soviet society. Following V.I. Lenin's advice, when the need to scale the next difficult height arises "in the incredibly hard task of building socialism," the party turns "to wider and wider strata of the workers" (Complete Collected Works, vol 37, p 425).

It is now turning to the entire working class. Because acceleration and restructuring constitute a task of tremendous complexity which requires the unification and constant augmentation of the efforts of all working people, above all the working class. And in particular because the USSR's working class has reached a level of social, political, professional, and cultural development such that literally all the workers, all the working people, and not only their vanguard, can and must participate actively in resolving the complex tasks of accelerating the country's socioeconomic development.

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CSO: 1828/25

## CIVIL AVIATION

### AIRCRAFT ENGINE PROBLEMS CONCERN CIVIL AVIATION MINISTRY

[Editorial Report] Moscow VOZDUSHNYY TRANSPORT in Russian 23 October 1986 carries on pages 1-3 a series of reports on the 16 October meeting of the USSR Ministry of Civil Aviation Collegium. The meeting was held to review the ministry's work during the first nine months of 1986.

Deputy Minister V. Gorlov states that Aeroflot has worked "under difficult conditions for nine months. Above all because of serious shortages of engines for Tu-154 and Il-86 aircraft. In order to meet the schedule, it was necessary to transfer 340 engines from some aircraft to others, in the process expending nearly 57,000 man-hours above norm."

Economic Planning Main Administration Chief V. Solomatin notes that "the problem of Il-86 and Tu-154 aircraft engine repair is causing serious concern. The downtimes for these aircraft are considerable. The Air and Ground Production Equipment Orders Main Administration, the Operation and Repair of Aviation Technical Equipment Main Administration and other administrations responsible for resolving this problem must take decisive steps in this direction." Solomatin also calls for a decision regarding the extension of the service life [resurs] of the Tu-134.

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## MARITIME AND RIVER FLEETS

### CHEMICAL CARRIER ALEKSANDR KAVERZNEV PROFILED

Moscow MORSKOY FLOT in Russian No 8, Aug 86 pp 40-43

[Article by L. Dvorovenko, chief of the technical division of the Latvian Shipping Company: "The Chemical Carrier Aleksandr Kaverznev"]

[Text] The chemical-carrier tanker Aleksandr Kaverznev, designed to transport chemical cargoes with an IMO-P-Sh of product mixes, the first in the history of the Ministry of the Maritime Fleet, has been accepted into the transport fleet of the Latvian Shipping Company. The ship was built in 1981 at the Swedish Oskapshamn Shipyard, of the class Det Norske Veritas +1A1 ICE 1A EO (chemical-carrier tanker). The ship's structures and equipment meet the requirements of the International Code for Construction and Equipment of Vessels Transporting Hazardous Liquid Chemical Cargoes, of the International Convention MARPOL-73/78 and SOLAS-74 and the regulations of the United States Coast Guard and the Italian Register for foreign ships stopping at ports in the United States and Italy.

#### Basic Specifications

Length:	
Overall	129.65 meters
Between perpendiculars	126.76 meters
Overall width	19.04 meters
Molded depth	8.75 meters
Draft	6.95 meters
Deadweight	8661 tons
Capacity:	
Gross	5712.86 reg. ton
Net	3159.98 reg. ton
Power	4.26 MW
Speed	14.3 knots
Navigational range	5500 miles
Navigational area	unlimited

The chemical carrier Aleksandr Kaverznev is a single-screw, single-deck motor-ship with a sloping foresten, transom stern, forecastle, engine room located in the stern and a superstructure for housing and service facilities.

The ship's hull is welded. The hull is framed according to a combined system, in consideration of ensuring the necessary strength of the ship's structure, designed to transport chemical cargoes with a density of up to 2 tons/m<sup>3</sup>. The hull structure is reinforced in accordance with the requirements of Det Norske Veritas for ships of Ice Class ICE 1A, equal to class L1 for the USSR Register Rules. There are side keels to ease the rolling of the ship.

Inner bottom plating extends the entire length of the ship between the forepeak and afterpeak bulkheads. The double bottom under the cargo tanks is divided by bulkheads into eight compartments, designed for insulated ballast. The cargo space is restricted by bow and stern cofferdams and is divided by transverse and longitudinal impenetrable bulkheads for eight side (for each side) and seven central tanks, including five cargo tanks and one sedimentation tank (stern), with a cofferdam between them. The central tanks are designed mainly to ship superphosphoric acid and other chemical cargoes of the IMO-P category. Taking into consideration the physical and chemical characteristics of the superphosphoric acid and other cargoes in the IMO-P category noted for highly corrosive action, the bottom, bulkheads, deck, cargo pipeline and other structures in the central tanks were made of stainless steel.

In order to facilitate to the maximum the cleaning and washing operations, the central tanks are made smooth-walled, with an exterior assembly, with the exception of the transverse bulkheads, which have vertical corrugated metal sheets. The side tanks, counted on to transship chemical cargoes with a density of up to 1.6 tons/m<sup>3</sup>, are made of carbon steel, with the cargo pipeline in them made of seamless steel pipes. The surface of the side tanks and the structures and pipelines in them is protected with an anti-corrosion coating, resistant to the effect of chemical cargoes of the IMO-III category. Special compartments are fitted in the side tanks—wells for access to the inter-bottom tanks from the upper deck. The overall capacity of the cargo tanks is 11,108.4 m<sup>3</sup>, including central tanks for IMO-P cargoes—6005 m<sup>3</sup>, including on sedimentation tank with a capacity of 289.4 m<sup>3</sup>. The capacity of the inter-bottom tanks of the insulated ballast is 2363 m<sup>3</sup>, which ensures a bow draft of 2.7 m in the ballast passage of the ship.

The cargo system includes 16 SDS-5 immersion vertical single-stage centrifugal pumps produced by the Frank Mun Company (Norway), driven by high-pressure hydraulic pumps. Each of the central tanks is equipped with an individual immersion pump with a feed of 200 m<sup>3</sup>/hr, at a pressure of 0.9 MPa. Ten pumps with a feed of 100 m<sup>3</sup>/hr each, at a pressure of 0.9 MPa, are installed at the 16 side tanks, and at the same time the bow and side tanks are equipped with individual pumps, and the rest of the tanks—with a single pump for two adjacent tanks. In case the permanent cargo pump gets out of order, there is a portable vertical centrifugal cargo pump, type TK 4, with a feed of 70 m<sup>3</sup>/hr at a pressure of 0.7 MPa in a unit with the cargo and power hoses, and a crab winch, type 1F 250AL with a load-carrying capacity of 0.4 tons. The immersion pumps are installed in the tanks in a special anti-static well in the double bottom near the stern bulkhead.



The arrangement of the cargo system makes it possible to carry out cargo operations with 11 types of cargo at the same time, as well as loading one type of cargo through the general manifold without rearranging the ship's hoses. The pipeline of the cargo system is estimated for superphosphoric acid to move at a speed of over 2.5 m/sec.

One of the problems of marine transshipment of superphosphoric acid, which is distinguished by high specificational density and viscosity, is the need to equip the tanks with a means of preventing the formation, in the lower layer of the cargo, of a hard sediment which is not pumped off by the cargo pumps. For this purpose a pipe is run from the cargo pipelines on the upper deck to each central tank. A diffuser with special spray nozzles is fastened at its end at a level of 410 mm from the bottom. The cargo is agitated by being circulated with an immersion pump from the tank to the cargo pipeline on the deck, with its return to the tank along the pipe with the diffuser at its end. At the same time, the nozzle of the diffuser creates a turbulent flow in the bottom layer of the cargo, thus keeping the hard components of the superphosphoric acid in emulsion.

Heating the cargo to the temperature assigned by the technical specifications for marine transshipment is ensured automatically in the central tanks, also by its circulation by immersion pumps through a heat exchanger. The heating productivity is 498 kcal/hr (for superphosphoric acid). Each of the five heat exchangers installed on the deck is hooked up in parallel with the cargo pipeline of its pump. The sedimentation and side tanks are equipped with heating coils made of stainless steel. Steam and hot water are used as heating agents in the cargo heating system. The cargo heating system includes a steam heater with a heating surface of 66 m<sup>2</sup> and a centrifugal circulation pump with a feed of 85 m<sup>3</sup>/hr at a pressure of 0.18 MPa.

Each cargo tank is equipped with an independent gas exhaust pipe with a safety valve, which automatically comes into action if there is a change in the permissible pressure in the tank (vacuum). The gas exhaust pipe has a branch pipe for connection with a flexible hose, along which return to the shore unit is provided for the vapor from the cargo formed during cargo operations. It also receives inert gas for the tanks, if necessary.

A hydraulic drive fan, type NS5V-063-95, with a feed of 20,000 m<sup>3</sup>/hr, is designed to ventilate the cargo facilities. The fan is paired with a type KDES-06-2-4 heater, ensuring the heating of the air fed into the cargo tanks from 45 to 85°C. The main ventilation channel is laid under the flying bridge. The channel has branch pipes to connect the flexible hoses. The length of each hose makes it possible to lower it into the tank to a level of 2 m from the bottom. The ship also has four portable fans.

The cargo tanks are equipped with a distance reading system to tell the temperature of the cargo, and with floating cargo level indicators. The central tanks are provided with signal transmitters for the upper level of the cargo and type FTC 481 Z instruments for automatic control of the quick-shut-off valves placed on the receiving connection pieces of the cargo pipelines, which, when the permissible level of cargo in the tanks is reached, go into action, cutting off the flow.

The ship has a computer of the Loadmaster V20 type with a display issuing the necessary operations information, including information on the draft, stability, ability to keep afloat when damaged and strength of the ship with various load variants.

The cargo tanks can be washed with sea water and fresh water by means of small portable washing machines. The sea water is fed to the washing machines from a fire main. There is a special system to wash the tanks with fresh water, which includes a tank with a supply of washing water (in the stern cofferdam) with a capacity of  $67.5\text{m}^3$ .

The tank-washing system has a water heater with surface heating of  $22\text{ m}^2$ , with a heating productivity of  $40\text{ m}^3/\text{hr}$  of water from  $15$  to  $90^\circ\text{C}$  at a pressure of  $0.7\text{ MPa}$  and a hydraulic drive centrifugal pump type 4VF-2, with a feed of  $80\text{ m}^3/\text{hr}$  at a pressure of  $0.9\text{ MPa}$ , installed in the stern ballast pump compartment.

The washing pump is remote-controlled from the upper deck. It is possible to hook it up to the ballast system. An ejector with a feed of  $3\text{ m}^3/\text{hr}$  is designed to clean the tanks. The waste wash water, containing chemicals, is turned over from the sedimentation tank to the shore purifying structures by the cargo pump.

Included in the ballast system serving the inter-bottom insulated ballast tanks are two hydraulic drive centrifugal pumps type UN 250/200 with a feed of  $400\text{ m}^3/\text{hr}$  each at a pressure of  $25\text{ m}$  water column. The pumps are installed in the stern ballast pump section and are equipped with a remote control system from the upper deck.

In accordance with the requirements of the International Convention MARPOL-73/78, there are installed in the engine room of the ship an oily water storage tank with a capacity of  $22\text{ m}^3$ , equipped with a type DS-3A level signalling device and an oily water separator with an instrument for monitoring the oil content in the mixture purified by the separator. The separator ensures the cleaning of the oily waters to a content of 15 parts of oil per million parts of the purified mixture.

The ship is equipped with a sewage water collection tank with a capacity of  $18\text{ m}^3$  and a vacuum system for fecal water to avoid polluting the sea with sewage and every-day waste waters. The vacuum system for fecal waters includes a tank with a capacity of  $4\text{ m}^3$ , made of stainless steel, two electric powered vacuum pumps type AFP-HA-004, including one spare, and means for automatic control of the system's operation.

The ship's fire protection includes two basic systems: water extinguishing and foam extinguishing. The water extinguishing system is served by two electric-powered centrifugal pumps type Z-12-104 with a feed of  $90\text{ m}^3$  each at a pressure of  $1.2\text{ MPa}$  and an emergency hydraulically driven centrifugal pump type 4VF2 with a feed of  $75\text{ m}^3$  at a pressure of  $1.2\text{ MPa}$ , installed in the steering mechanism facilities.

At the foam extinguishing station, located in the stern superstructure, there are two tanks with a capacity of 3.5 and 3.6 m<sup>3</sup>, with a foaming agent, two automatic dispensers type SDA-40/150, designed to form a 6%-foam-forming emulsion, and two electric-powered centrifugal horizontal pumps type FOKYe NS with a 50-5 feed each of 175 l/min at a pressure of 1.2 MPa. An alcohol-resistant foaming agent, type Polidol FP-S, is used to extinguish fires in water-soluble chemical cargoes.

The engine room is equipped with an additional efficient fire-extinguishing system, including ten cylinders filled under pressure with the extinguishing agent Khalon-1301. The cylinders are located in the places where fire is most likely to break out. The ship is equipped with an automated fire alarm system type BV-754ATE, produced by the Autronic Company, which sends out light and sound signals if fire breaks out.

The main engine on the ship is an eight-cylinder, four-stroke non-reversible engine type 8ZL40/48, manufactured at the Zgoda Sulzer enterprise (PNR), with a gas turboblower type VTP 4012P, produced by the Brown Boveri firm. The engine operates on fuel with a viscosity of up to 1500 from Redwood 1 at 100°F, generating a maximum continuous power of 4.26 MW (5800 h.p.) at a rotational frequency of 530 rpm.

The engine is connected with the propeller shaft through a reducer, type GCH 900//1253, manufactured by the Lochmann and Stoltervocht firm (FRG). The rotational frequency of the propeller shaft is 170 rpm. The deadwood arrangement for the propeller shaft is equipped with a Simplex-Compact type stuffing box seal. The four-bladed propeller screw, with a regulated pitch 4050 mm in diameter, made of stainless steel, was manufactured by the Kamewa firm (Sweden).

The ship's power plant includes two generators type GBL-630-VSA, with a power of 900 kV·A, 440 V, 60 Hz, driven by a Kh. Tsegelski-Sulzer engine, type 6 AL 25/30, with a power of 758 kW (1030 h.p.) at a rotational frequency of 720 rpm, and a shaft generator, type GBL-500-MK, with a power of 710 kV·A, 440 V, 60 Hz, at a rotational frequency of 1200 rpm.

The ship has, as an emergency source of electrical power, a brushless, self-exciting generator, type MC 344A, with a power of 75 kV·A, 440 V, 60 Hz, powered by a Fiat type motor with a power of 140 kW (190 h.p.), at a rotational frequency of 1800 rpm. The emergency diesel-generator is automatically started up from storage batteries when the main distributing board current is cut off.

Two automatic electric generators, type 2 SF42, with a feed of 76 m<sup>3</sup> each at a pressure of 3 MPa and an electric compressor type LE11 with a feed of 92.5 m<sup>3</sup>/hr at a pressure of 1 MPa provide compressed air for the power unit and the ship's service needs.

A compressor, type C3 6-HSZ, with a feed of 140 l/min at a pressure of 32.5 MPa is designed to charge air into the cylinders of the insulating breathing apparatus used by crew members.

The steam needed by the ship is provided by a water-tube steam boiler, type AQ3, with a steam productivity of 7800 kg/hr at a pressure of 0.7 MPa, and a waste-heat boiler, type AQ7, with a steam productivity of 1500 kg/hr at a pressure of 0.7 MPa, operating on the exhaust gases of the main engine. The water-tube boiler operates on fuel with a viscosity of up to 1500 from Redwood 1 at 100°F. The boilers are equipped with devices for automatic control of their operating conditions and of the system of emergency-warning signals on a change in the established parameters and on malfunctions.

An automatic vacuum distilling unit, type JWP-36-125, with a productivity of 10 tons/day ensures replenishment of the fresh water supply on the ship.

The number of devices to automate the remote control and monitoring of the work of the power unit, auxiliary mechanisms and systems in operation on the ship corresponds to the rules of the Det Norske Veritas for the EO class, equal to the sign A1 in the notation for the USSR Register Class for automated ships with non-watch service for the engine room under normal operating conditions.

The ship's controllability is ensured by a streamlined balanced rudder, which is relayed from side to side by an electrohydraulic steering engine, type RMU 350-30, with two pump units, type D4S 038 K1. When one pump is in operation the steering machine relays the rudder from side to side, at the ship's full speed, in 28 sec. The steering machine is automatically controlled by an automatic steering mechanism, type SPR 680.

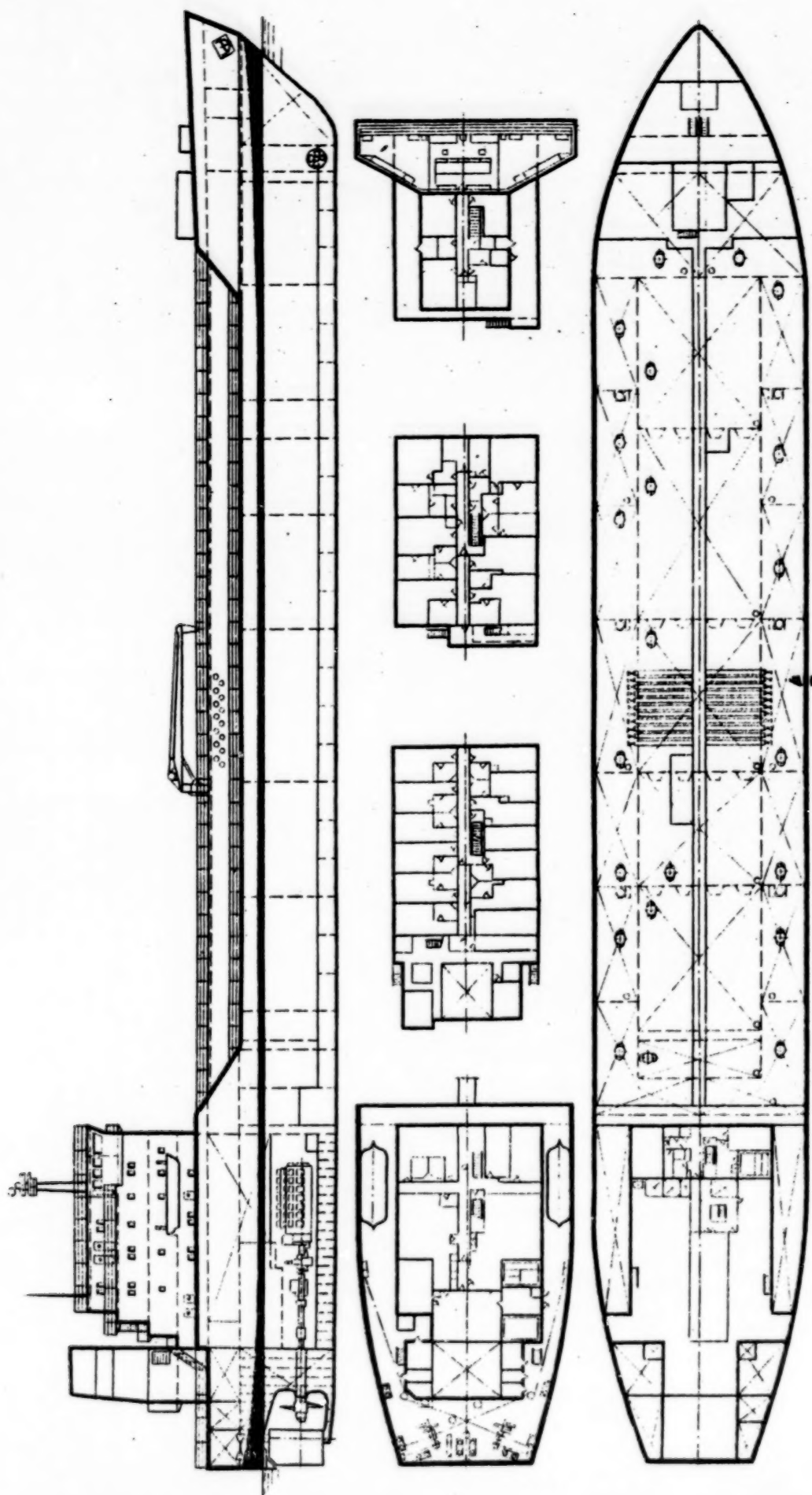
A steering device, type 1650/800 MSFP, with a fixed-pitch screw, is installed in the bow of the ship. The steering device is actuated by a hydraulic pump, type F6K/4-265-172, with a power of 588 kW (800 h.p.). The steering unit is equipped with devices for remote control and monitoring of the parameters of the operation, automatic safety mechanisms and emergency-warning signals, sent out to the central control panel and the wheel house.

The anchor and hawser assemblies include two hydraulically driven windlasses in the bow, type IAS 45/50-46 Split, paired with automated mooring winches, and two hydraulically driven automated mooring winches in the stern, type MFS-45 and MFS-80. The anchor assembly is equipped with devices for remote control from the wheel house.

The life-saving devices consist of two fiber glass motor boats with a capacity of 25 persons each and two inflatable life rafts of the Viking-25K type, with a capacity of 25 persons each. The ship also has devices for individual protection of the crew members against the effect of toxic chemical cargoes, and sets of complete protective outfits in accordance with the requirements of the IMO Code for Building and Equipping Ships Carrying Dangerous Liquid Chemical Cargoes, and the Rules of Classification and Building of Chemical Carriers of the USSR Register. The ship has portable gas analyzers, oxygen gages and explosion meters to monitor the concentration of cargo fumes formed during loading operations and transshipment.



General Arrangement of the Ship



The stern superstructure is equipped with housing facilities for 18 crew members and a pilot, including 9 unitized cabins for the command personnel. The crew members are accommodated in single cabins with individual shower and toilet. The ship has a wardroom, recreation rooms, an infirmary and a sauna.

The living and service facilities are equipped with an air conditioning system maintained by a compressor unit of the Stal firm, and by air conditioners.

The ship is fitted with modern electric radio navigational equipment, including two radar units, type RM 1600 and RM 1625, and an induction log, type DSL-25 produced by the Raytheon firm (England), a satellite navigation system, type JLE-3400, of the Raytheon firm (Japan), a fathometer, type LAZ 51AT, of the Elak firm (FRG), and other apparatus ensuring safe navigation and reliable shore communications.

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